

## A Retrospective and Prospective Study of Submucosal Fat Deposition Correlating with Type of Inflammation in 200 appendicectomy specimens

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### ABSTRACT:

Appendix is one of the commonest surgical specimens received for histopathological examination. We observed off late that most of the specimens have the presence of fat in the submucosa and muscular coat almost routinely, though it has been described as a rare occurrence in the literature. This finding kindled our interest to undertake a retrospective and prospective study of 200 Appendicectomy specimens. Aim of our study is to grade the presence of fat in the submucosa and muscular coat correlating it with age, sex and type of Appendicitis. Appendicectomy specimens were studied both grossly and microscopically at three different levels – base, body & tip. Fat infiltration was present in the wall of appendix in 125(62.5%) cases of which Acute Appendicitis with fatty infiltration was 13(10.4%) cases and Chronic Appendicitis with fatty infiltration was 112(89.6%) cases. We observed in our study that the incidence of fatty change was more in Chronic Appendicitis. The fat deposition is mainly seen in the Chronic Appendicitis which is statistically significant with P value < 0.05. Fatty change was more commonly seen in prime age group individuals. In some cases it is associated with an increase in the number lymphoid follicles.

**Keywords:** Appendicitis, Acute, Chronic, Submucosal fat.

### INTRODUCTION

Appendicitis is the normal true diverticulum of caecum that is more prone to acute & chronic inflammation. The life time risk for appendicitis is 7 %. Males are slightly affected more than females. Appendicitis still remains the most common acute abdominal condition and the etiology remains obscure. The disease is much more common in western countries than in other parts of world which reflect the difference in dietary habits in population. This kindled an interest to know more about the submucous fat in Acute And Chronic Appendicitis cases and its distribution in different age groups and its significance.

### MATERIALS AND METHODS

200 Appendicectomy specimens from our hospital were made used for the study. Cases were charted out according to the type of infiltrating cells, age, sex and the grade of fat. The fat present in the submucosa was graded in the following manner.

- Grade - 1: Small fatty lobules were seen in the submucosa [figure 1]
- Grade – 2: Two or Three aggregation of fat lobules seen in the submucosa at two or three places [figure 2]
- Grade – 3: Large number of aggregations of fat lobules were seen in the submucosa [figure 3]

- Grade – 4: Fat appearing in an annular form in the submucosa [figure 4]

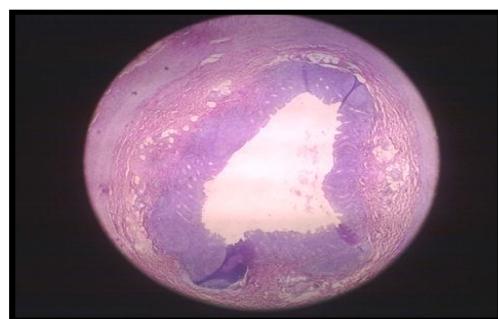


Figure 1: Photomicrograph shows Grade – 1 type of fatty infiltration in the submucosa of appendix.

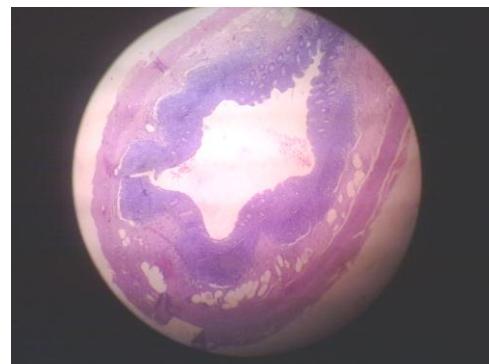


Figure 2: Photomicrograph shows Grade – 2 type of fatty infiltration in the submucosa of appendix

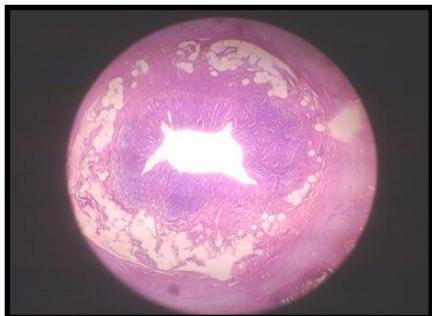


Figure 3: Photomicrograph shows Grade - 3 fatty infiltration in the submucosa of appendix

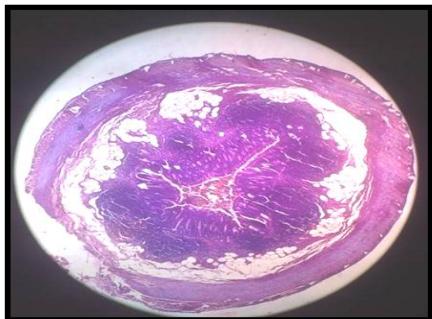


Figure 4: Photomicrograph shows Grade - 4 fatty infiltration in the submucosa of appendix

## RESULTS & OBSERVATIONS

We have studied 200 histopathological sections of Appendicectomy specimens and observed the following findings:-

Fat infiltration was present in the wall of appendix in 125 cases (62.5%). No fat infiltration in 75 cases (37.5%). We also found that in this prime age group there was higher grade of fat deposition [table 1&2]. The sex wise ratio is not significant.

Table no 1: Fatty infiltration in different age groups in acute and chronic cases

S.No	Age Group	Chronic appendicitis	Acute appendicitis
1	0 – 10yrs	01	0
2	11-20yrs	30	06
3	21 – 30yrs	35	03
4	31 – 40yrs	23	04
5	41 – 50yrs	12	0
6	51 – 60yrs	07	0
7	61 – 70yrs	04	0
		112cases	13cases

Table no 2: Grading of fat in prime age groups

Age (Yrs)	Grade 1	Grade -2	Grade-3	Grade -4
21-30	12	16	4	4
31-40	1	5	12	9
41-50	3	6	1	3

Acute appendicitis cases with fatty infiltration -13 cases (10.4%) – [table 3]

Table no 3: Grading of fat in acute appendicitis

Acute appendicitis				
S.No	Grade	Male	Female	Total
1	Grade – 1	4	-	4
2	Grade -2	3	2	5
3	Grade- 3	1	2	3
4	Grade - 4	0	1	1
		8	5	13cases

Chronic appendicitis cases with fatty infiltration - 112 cases (89.6%) – [table 4]

Table no 4: Grading of fat in the chronic appendicitis

Chronic appendicitis				
S.NO	Grade	Male	Female	Total
1	Grade – 1	10	16	26
2	Grade -2	14	24	38
3	Grade- 3	09	16	25
4	Grade – 4	15	8	23
				112cases

Grade I and Grade II type of fat deposition was more common.58.2% than Grade III & Grade IV 41.6%. Our observation of fatty change in the Chronic Appendicectomy specimens with varied quantum, made us to note the presence and grade it. We graded the fat in the wall of appendix by based on the number and distribution of adipocytes.(As described in the materials & methods).

## DISCUSSION:

Acute Appendicitis is due to obstruction of the lumen of appendix. The resulting secretion under pressure causes congestion, pain, edema, ulceration & makes it more prone for infection. The most common cause of obstruction is faecalith and rarely it can be a foreign body, worms, calculus, and tumor.[1] The diffused lymphoid hypertrophy is also a common cause for obstruction. Non obstructive acute appendicitis can be due to infection mainly due to virus. Frequency of acute appendicitis is more in prime age(21-40) rather than extremes of age. Grossly the appendix with acute inflammation shows the purulent exudates coating the serosa. Mucosa will be hyperemic & can be ulcerated. Microscopical changes range from minimal focal inflammation to total necrosis of appendiceal wall.[2] Groups of neutrophils in the muscularis propria are diagnostic of Acute Appendicitis. Most common complication of Acute Appendicitis is perforation.[3]

In Chronic Appendicitis signs and symptoms are vague with the collection of chronic inflammatory cells in the muscular wall of appendix, rarely with plasma cells & eosinophilic infiltration. Fibrous obliteration of appendiceal tip is common. Sometimes there is significant increase in neural ganglionic cells.[4]

Other causes of Chronic Appendicitis is due to Enterobius Vermicularis(Oxyuriasis), Strongyloides stercoralis, schistosomiasis, H.pylori, Measles, Infectious mononucleosis, ulcerative colitis. Crohn's disease and sarcoidosis. Existence of Chronic Appendicitis as a distinct clinopathological condition has been debated.[5] Certainly it is an organizing phase of Acute Appendicitis with the histological findings of granulation tissue mixture of neutrophils, lymphocytes, plasma cells & fibrosis.[6] Here the sublethal injury to the cells due to edema producing a hypoxia may be the cause for fatty change which is mainly seen in the chronic appendicitis (89.6%),as the fat deposition is mainly seen in the Chronic Appendicitis which is statistically significant P value < 0.05. We also found that in prime age group there was higher grade of fat deposition. The sex wise ratio was not significant. Grade I and Grade II type of fat deposition was more common.58.2% than Grade III & Grade IV 41.6%.

## CONCLUSION

Presence of fat or its significance has not been studied or described so far in literature. we conclude in our study that Chronic Appendicitis cases showed a higher grade of fat deposition and number is also more. The probable mechanism for the fatty change is the inflammation and mucosal oedema.[7] Our study raises the following questions. Does chronic inflammation and sub lethal injury play a major role in fatty change? Does Food habits like increased exposure to chemically treated foodstuff and more consumption of readymade food? Is it because of the changing life style making the people more prone for food allergies and subclinical gastro intestinal infections?.

We feel that this finding of increase in fatty deposition is significant so, further collection of data especially in relation to regional distribution, food habits is essential to elucidate the probable cause and its significance. We are publishing this paper to bring an awareness about the presence of fat in the submucosa, so that we can generate interest and collect more data. This is only a preliminary report. We are working further in detail and on increasing number of specimens. We will be glad to receive your feedback and findings.

## ACKNOWLEDGEMENT

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## REFERENCES

- [1] Burkitt. DP. (2000) The aetiology of appendicitis. *Ann Dian pathol*, 4:46- 58
- [2] Andreou P, Blain S, Duboulay CEH. (1990). A histopathological study of appendix at autopsy and after surgical resection. *Histopathology*, 17(5): 427 – 431.
- [3] Guidry.SP., Poole.GV.( 1994) The anatomy of appendicitis. *Am Surg*, 60 : 68 -71.
- [4] Segal.GH, Petras.RE.(1997) Vermiform appendix in Sternberg . Histology for pathologists, ed.2. Philadelphia, lippineott Ravenpp 539-550
- [5] Gray GF jr. (1986), Waekym. PA.,Surgical pathology of vermiform appendix part – 2. *pathol Annu*, 21:111- 144.
- [6] Sisson RG., Ahlvin. RC., Harlow. MC. (1971) Superficial mucosal ulceration and pathogenesis of acute appendicitis in child hood. *Am Surg*, 122: 378 – 380.
- [7] Dymock . RB. (1977) Pathological changes in appendix. A review of 1000 cases pathology, 9:331 – 339.

**Shri Sathya Sai Medical College and Research Institute**  
**Ammapet ,Kancheepuram, 603 108****Decision of the Institutional Ethics Committee (IEC)****IEC No: 2011/56**

<b>Protocol title:</b> Study about fat deposit in different layers of the wall of the appendix		
<b>Principal Investigator:</b> Dr. Swayam Jothi, DR. S. ANURADHA, DR. K. BHARATH		
<b>Name &amp; Address of Institution:</b> Department of Anatomy		
<input checked="" type="checkbox"/> New review	<input type="checkbox"/> Revised review	<input type="checkbox"/> Expedited review
<b>Date of review (D/M/Y):</b> 22-11-2011		
<b>Decision of the IEC:</b>		
<input checked="" type="checkbox"/> Recommended	<input type="checkbox"/> Recommended with suggestions	
<input type="checkbox"/> Revision	<input type="checkbox"/> Rejected	
<b>Suggestions/ Reasons/ Remarks:</b>		
1. The Project should be merged with the proposal no IEC/2011/58.		
<b>A report on the status of this study should be submitted to the IEC at the end of the 3months from the date of issue.</b>		
<b>Recommended for a period of :</b> 1year		

**Please note \***

- Inform IEC immediately in case of any adverse events.
- Inform IEC in case of any change of study procedure, site and investigator
- This permission is only for period mentioned above. Completion report to be submitted to IEC.
- Members of IEC have right to monitor the trial with prior intimation.

  
 Signature of The Convenor,  
 Institutional Ethical Committee.

**THE CONVENER,  
INSTITUTIONAL ETHICAL COMMITTEE,  
SHRI SATHYA SAI MEDICAL  
COLLEGE & RESEARCH INSTITUTE  
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